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10/533,645

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Liro Hietanen

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EXAMINER

SLOMSKI, REBECCA

ART UNIT

PAPER NUMBER

2877

MAIL DATE

DELIVERY MODE

12/28/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/533,645

Applicant(s)

HIETANEN ET AL.

Examiner

Rebecca C. Slomski

Art Unit

2877

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 January 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 25-46 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 25-46 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 May 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 08/02/05.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Objections

1. Claim 31 is objected to because of the following informalities: line 9 contains a period. However, a period may not be used elsewhere besides at the end of a claim. See MPEP 608.01(m). Appropriate correction is required.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

2. Claim 25 is rejected under 35 U.S.C. 101 based on the theory that the claim is directed to neither a "process" nor a "machine," but rather embraces or overlaps two different statutory classes of invention set forth in U.S.C. 101 which is drafted so as to set forth the statutory classes of invention in the alternative only. *Id.* at 1551. It is unclear from the claim language which statutory class the applicant intends to claim since line 1 states "an optical measurement and inspection method" but the claim limitations comprise structural elements.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 25 is rejected under 35 U.S.C. 112 second paragraph as being indefinite, for claiming both apparatus limitations "a sheet of material....at least one signal generator....at least two light emitters...." and a method "an optical measurement and inspection method." It is unclear as to which statutory class the limitations attempt to adhere to. Clarification is necessary.
4. Additionally, claims 25 and 37 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In claim 25, several elements are repeated several times throughout the claim, for example, light emitters (line 2, 4, 8, 11, 15, 18, 23), light receiver (line 1-2, 4, 11, 16, 24), signal generator (line 3, 10, 14), and rays of light (line 18, 20, 22, 29). There is confusion over the number of these elements since it is unclear whether the light emitters of line 2 are the same light emitters of line 4, 8, 11, 15, 18, or 23 since there is no antecedent language to suggest likewise. However, the examiner understands, from reading the specification that the repetitive language intends to imply the previously mentioned element. This interpretation has been used the examiner for the purposes of this examination. Claim 37 is rejected likewise. Clarification is required.

5. Claims 25, 36, 37 and 46 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Lines 14-17 in claim 25, line 3 in claim 36, lines 24-26 in claim 37, and line 3 in claim 46, recite the limitation "a signal generator drives....and at least one light receiver with both of these frequencies..." and "the signal generator drives at least two light receivers". It is unclear to the examiner how to "drive" a receiver with a frequency. A receiver cannot be driven with a frequency, but rather can be tuned as to detect a specific frequency. Examiner believes the applicant to have incorrectly worded the sentence.

Correction is necessary.

6. Claims 25 and 37 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Line 22 in claim 25 and line 13 in claim 37, cite the limitation "at least two grazing, transparent and/or reflected rays". The term "transparent angle" is unclear to the examiner. Where applicant acts as his or her own lexicographer to specifically define a term of a claim contrary to its ordinary meaning, the written description must clearly redefine the claim term and set forth the uncommon definition so as to put one reasonably skilled in the art on notice that the applicant intended to so redefine that claim term. *Process Control Corp. v. HydReclaim Corp.*, 190 F.3d 1350, 1357, 52 USPQ2d 1029, 1033 (Fed. Cir. 1999). The term is

indefinite because the specification does not clearly redefine the term. Examiner believes the applicant to have incorrectly worded the sentence. Correction is necessary.

7. With respect to claims 26, 27, 38 and 39, the limitation "beams" in line 3 of claims 26 and 38 and in line 4 of claims 27 and 39 lack antecedent basis in the claim.

8. Claims 29 and 30 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential cooperative relationships of elements, such omission amounting to a gap between the necessary structural or methodological connections. See MPEP § 2172.01. The omitted cooperative relationships are: the photocurrent converted to voltage, the photocurrent or voltage amplified, and the limitations in claim 25. It is unclear at which point these new limitations are inserted in the previously claimed method of claim 25.

9. With respect to claims 30, 31 and 41, the limitation "voltage" in line 3, lacks antecedent basis in the claim.

10. With respect to claims 31 and 41, the limitation "analog signals" in line 11, lacks antecedent basis in the claim.

11. Claims 31 and 41 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential cooperative relationships of elements, such omission amounting to a gap between the necessary structural or methodological connections. See MPEP § 2172.01. The omitted cooperative relationships are: the fault detection circuit and the rest of the limitations found in claims 25 and 37. It is unclear at which point these new limitations are

inserted in the previously claimed method of claim 25 or how they are related to the structure of claim 37.

12. With respect to claims 33 and 43, the limitation "said optical measurements" lack antecedent basis in the claim.

13. Claims 34 and 44 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite in that it fails to point out what is included or excluded by the claim language. The claims recite the limitation "defects may feature aspects of the following..." It is indefinite as whether the applicant is claiming the proceeding limitations or merely suggesting types of defects. Correction is required.

14. With respect to claim 35, the limitations "detector module" and "detector array" in lines 3 and 4, lack antecedent basis.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 25, 26, 29, 30, 32, 33, 34, 35, 37, 38, 42, 43, 44, and 45 are rejected under 35

U.S.C. 102(b) as being anticipated by Kreuzer et al. U.S. Patent #4,937,449.

15. With respect to claim 25, Kreuzer et al. discloses a device for the inspection of films comprising:

- A sheet of material lies or traverses between and/or in front of at least two light emitters and at least one light receiver (Figure 1, film 1, light sources 2, 2')
- At least one signal generator controls at least one light emitter and at least one light receiver by sending them an electronic synchronisation signal and thereby synchronises the emission and detection of light rays (Col.3, L 32-38, Col.4, L 20-25)
- At least one signal generator drives at least two light emitters with different carrier frequencies waveforms and/or phases, and at least one light receiver with both of these frequencies, waveforms and/or phases (Col.3, L 32-45, Col.4, L 20-25)
- At least two light emitters emit at least two rays of light (Col.3, L 5-17)
- At least two rays are incident on the stationary or traversing sheet (Figure 1, Col.3, L 5-17)
- At least two grazing, transparent and/or reflected rays of light from the sheet or directly from the light emitters are detected by the same light receiver (Figure 1, photo-receiver 3)

- The intensity of at least one said emitted ray of light follows a carrier waveform signal and at least one received light ray is demodulated from the carrier waveform signal using the electronic synchronization signal (Col.4, L 22-25)
- At least two rays of light are converted to photocurrent (Col.4, L 13-16)
- The processed photocurrent and/or changes in the processed photocurrent are diagnosed and observed to find defects and/or determine characteristics of said sheet of material (Abstract)

16. With respect to claim 37, Kreuzer et al. discloses a device for the inspection of films comprising:

- A sheet of material lies or traverses between and/or in front of at least two light emitters and at least one light receiver (Figure 1, film 1, light sources 2, 2')
- At least two light emitters are arranged to emit at least two rays of light incident on at least one sheet (Figure 1, Col.3, L 5-17)
- Said at least two grazing, transparent and/or reflected rays of light from the sheet or directly from the light emitters are detected by the same light receiver (Figure 1, photo-receiver 3)
- At least one ray of light is arranged to be converted to photocurrent by at least one photoelectric device (Col.4, L 13-16)

- At least one signal generator is arranged to control at least one light emitter and at least one light receiver by sending them an electronic synchronisation signal and thereby synchronises the emission and detection of light rays (Col.3, L 32-38, Col.4, L 20-25)
- At least one signal generator is arranged to drive at least two light emitters with different carrier frequencies waveforms and/or phases, and at least one light receiver with both of these frequencies, waveforms and/or phases (Col.3, L 32-45, Col.4, L 20-25)
- The intensity of at least one said emitted ray of light is arranged to follow a carrier waveform signal and at least one received light ray is demodulated from the carrier waveform signal using the electronic synchronization signal (Col.4, L 22-25)
- The photocurrent and/or changes in the photocurrent are arranged to be diagnosed and observed to find defects and/or determine characteristics of said sheet of material (Abstract)

17. With respect to claims 26 and 38, Kreuzer et al. discloses all of the limitations as applied to claims 25 and 37 above. In addition, Kreuzer et al. discloses:

- Different beams from different emitters targeted to the same receiver measure different properties of the material sheet (Col.4, L 55- Col.5, L 11, wherein light

emitter 2 is primarily used for defects and light emitter 2' is for film and/or coat thickness)

18. With respect to claims 29 and 30, Kreuzer et al. discloses all of the limitations as applied to claim 25 above. In addition, Kreuzer et al. discloses:

- The photocurrent is converted to voltage (Col.4, L 13-15)
- Photocurrent or voltage is amplified (Col.4, L 13-16)

19. With respect to claim 32 and 42, Kreuzer et al. discloses all of the limitations as applied to claims 25 and 37 above. In addition, Kreuzer et al. discloses:

- The sheet material is film (Abstract)

20. With respect to claim 33 and 43, Kreuzer et al. discloses all of the limitations as applied to claims 25 and 37 above. In addition, Kreuzer et al. discloses:

- The location and/or size of at least one defect and/or other attribute of at least one defect and/or sheet thickness, reflectivity or other physical attributes of the sheet are derived from said optical measurements (Abstract, Col.5, L 6-11)

21. With respect to claim 34 and 44, Kreuzer et al. discloses all of the limitations as applied to claims 25 and 37 above. In addition, Kreuzer et al. discloses:

- One or more defects may feature aspects of the following: holes, pinholes, scratches, spots, stains, cracks, edge faults, streaks, surface faults (Col.5, L 6-11)

22. With respect to claim 35 and 45, Kreuzer et al. discloses all of the limitations as applied to claims 25 and 37 above. In addition, Kreuzer et al. discloses:

- At least one light detector comprises at least one photoelectric device and/or wave guide (Figure 1, photo-receiver 3, pin diaphragm 4)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 25, 36, 37, and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nicolaides et al. U.S. Patent #6,917,039.

23. With respect to claim 25, Nicolaides et al. discloses a system for combined photothermal modulated reflectance and photothermal IR radiometric system comprising:

- A sheet of material lies or traverses between and/or in front of at least two light emitters and at least one light receiver (Figure 1, sample 14, pump laser 12, probe laser 16)
- At least one signal generator controls at least one light emitter and at least one light receiver by sending them an electronic synchronisation signal and thereby

synchronises the emission and detection of light rays (Col.5, L 18-21, Figure 1, signal generator 50)

- At least one signal generator drives a light emitter and at least one light receiver with both of these frequencies, waveforms and/or phases (Col.5, L 18-21, Figure 1, signal generator 50)
- Light emitters are driven with different carrier frequency waveforms and/or phases (Col.3, L 1-9)
- At least two light emitters emit at least two rays of light (Col.3, L 1-9)
- At least two rays are incident on the stationary or traversing sheet (Figure 1, Col.3, L 50-51)
- At least two grazing, transparent and/or reflected rays of light from the sheet or directly from the light emitters are detected by the same light receiver (Col.3, L 46-49)
- The intensity of at least one said emitted ray of light follows a carrier waveform signal and at least one received light ray is demodulated from the carrier waveform signal using the electronic synchronization signal (Col.4, L 62- Col.5, L 3)
- At least two rays of light are converted to photocurrent (Col.4, L 63, detected by photodetector that by definition converts light into current)

- The processed photocurrent and/or changes in the processed photocurrent are diagnosed and observed to find defects and/or determine characteristics of said sheet of material (Col.5, L 3-7)

However, the method and system of Nicolaides et al. fails to disclose at least two light emitters driven with the signal generator. It would have been obvious to one of ordinary skill in the art at the time the invention was conceived to drive all emitters with the signal generator rather than pre-programming one of the emitters (probe laser) ahead of time with a constant signal, since if both can be controlled by the signal generator, the system can be more accurately tailored for the specific inspection required.

24. With respect to claim 37, Nicolaides et al. discloses a system for combined photothermal modulated reflectance and photothermal IR radiometric system comprising:

- A sheet of material is arranged between and/or in front of at least two light emitters and at least one light receiver (Figure 1, sample 14, pump laser 12, probe laser 16)
- At least two emitters are arranged to emit at least two rays of light incident on at least one sheet (Figure 1, Col.3, L 50-51)
- At least two grazing, transparent and/or reflected rays of light are arranged to be detected by the same light receiver (Col.3, L 46-49)

- At least one ray of light is arranged to be converted to photocurrent by at least one photoelectric device (Col.4, L 63, detected by photodetector that by definition converts light into current)
- At least one signal generator is arranged to control at least one light emitter and at least one light receiver by sending them an electronic synchronisation signal and thereby synchronises the emission and detection of light rays (Col.5, L 18-21, Figure 1, signal generator 50)
- At least one signal generator is arranged to drive one light emitter with a carrier frequencies, waveforms and/or phases, and at least one light receiver with both of these frequencies, waveforms and/or phases (Col.5, L 18-21, Figure 1, signal generator 50)
- The intensity of at least one said emitted ray of light is arranged to follow a carrier waveform signal and at least one received light ray is demodulated from the carrier waveform signal using the electronic synchronization signal (Col.4, L 62- Col.5, L 3)
- The processed photocurrent and/or changes in the processed photocurrent are arranged to be diagnosed and observed to find defects and/or determine characteristics of said sheet of material (Col.5, L 3-7)

However, the method and system of Nicolaides et al. fails to disclose at least two light emitters driven with the signal generator. It would have been obvious to one of ordinary skill in the art at the time the invention was conceived to drive all emitters with the signal generator rather than pre-programming one of the emitters (probe laser) ahead of time with a constant signal, since if both can be controlled by the signal generator, the system can be more accurately tailored for the specific inspection required.

25. With respect to claims 36 and 46, Nicolaides et al. discloses all of the limitations as applied to claims 25 and 37 above. In addition, Nicolaides et al. discloses:

- The signal generator drives at least two light receivers with different carrier frequencies, waveforms, and/or phases (Figure 1, signal generator 50, photo detector 32, infrared detector 36)

Claims 27 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kreuzer et al. U.S. Patent #4,937,449 in view of Kobayashi et al. U.S. Patent #5,245,671.

26. With respect to claims 27 and 39, Kreuzer et al. discloses all of the limitations as applied to claims 25 and 37 above. However, Kreuzer et al. fails to disclose the three-dimensional structure of a defect is detected with more than one beams.

Kobayashi et al. discloses an apparatus for inspecting circuit boards comprising:

- The three dimensional structure of a defect is detected with more than one beams
(Col.2, L 15-34)

It would have been obvious to one of ordinary skill in the art at the time the invention was conceived to include more than beam for inspection as in Kobayashi et al. in order to detect the three-dimensional structure of a defect since it was well known in the art that three-dimensional defect sensing is performed by a plurality of irradiation directions (Kobayashi et al, Col.2, L 24-26) and to be able to determine the three-dimensional structure of a defect would be desirable in order to classify and repair the defect, steps that would save time and repeated errors.

Claims 28 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kreuzer et al. U.S. Patent #4,937,449 in view of Mitchell et al. U.S. Publication 2002/0020818.

27. With respect to claims 28 and 40, Kreuzer et al. discloses all of the limitations as applied to claims 25 and 37 above. However, Kreuzer et al. fails to disclose at least one carrier waveform signal is a sine wave, cosine wave, or a square wave signal.

Mitchell et al. discloses an apparatus and method for phase-sensitive imaging comprising:

- At least one carrier waveform signal is a sine wave, cosine wave, or a square wave signal. (P.0024, P.0028)

It would have been obvious to one of ordinary skill in the art at the time the invention was conceived to drive the emitters with a square wave as in Mitchell et al. since sine

waves, cosine waves, and square waves are all typical modulation forms in the art and by driving the emitters with a square wave, the apparatus records information that is easily interpreted and the demodulation of the receiver is simplified. (Mitchell et al., P.0028)

Citation

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- Brunnschweiler et al. U.S. Patent #5,047,640 discloses a web inspecting method comprising electronic synchronization
- Ogusu U.S. Patent #6,674,969 discloses two-optical signal generator having adjustable optical frequency difference
- Tegeder U.S. Publication 2004/0253824 discloses an arrangement for monitoring a thickness of a layer

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rebecca C. Slomski whose telephone number is 571-272-9787. The examiner can normally be reached on Monday through Thursday, 7:30 am - 5:00 pm EST.

Application/Control Number:
10/533,645
Art Unit: 2877

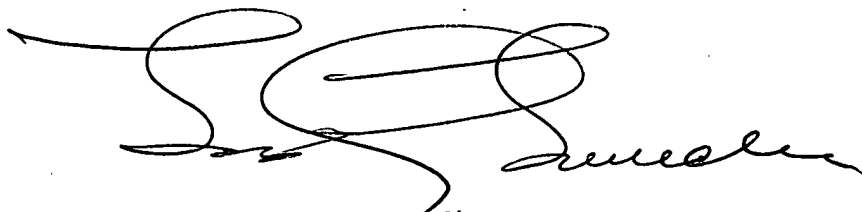
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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr. can be reached on 571-272-2059. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Rebecca C. Slomski
Patent Examiner



LAYLA G. LAUCHMAN
PRIMARY EXAMINER

rCS